

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**CLAIM 1 (currently amended)**

1           An antenna apparatus comprising:  
2           first and second linearly-polarized conductor-backed spiral antennas wherein said  
3           antennas both simultaneously transmit or both simultaneously receive on substantially the same  
4           frequencies, wherein said antennas are spaced from each other and further wherein each of said  
5           antennas comprises:  
6           a substrate having first and second flat, opposite, sides;  
7           a pair of spiral antenna elements disposed on said first side of said substrate in which  
8           each of said elements has a corresponding feed point; and  
9           a conducting ground plane disposed on said second side of said substrate, wherein said  
10          first antenna and said second antenna are oriented so that an imaginary line drawn through said  
11          feed points corresponding to said first antenna ~~does not coincide with~~ is orthogonal to an  
12          imaginary line drawn through said feed points corresponding to said second antenna.

**CLAIM 2 (original)**

1          The apparatus of claim 1 wherein said antennas are spaced vertically to radiate substantially  
2          parallel.

**CLAIM 3 (canceled)**

**CLAIM 4 (original)**

1. The apparatus of claim 1 in which said spiral elements take the form of an Archimedean spiral.

**CLAIM 5 (original)**

- 1 The apparatus of claim 1 wherein said spiral elements comprise a metal foil.

**CLAIM 6 (original)**

- 1 The apparatus of claim 1 wherein said antenna elements of said first and second antennas are
- 2 mounted in a common plane.

**CLAIM 7 (original)**

- 1 The apparatus of claim 1 wherein said substrate has a dielectric constant of approximately 1.

**CLAIM 8 (original)**

- 1 The apparatus of claim 7 wherein said substrate comprises a dielectric of DIVINYCELL
- 2 (trademark).

**CLAIM 9 (original)**

1 The apparatus of claim 1 wherein said first and second antennas share a common conducting  
2 ground plane.

CLAIM 10 (currently amended)

1 An antenna apparatus comprising:  
2 first and second linearly-polarized conductor-backed spiral antennas wherein said  
3 antennas both simultaneously transmit or both simultaneously receive on substantially the same  
4 frequencies, wherein said antennas are spaced from each other and further wherein each of said  
5 antennas comprises:  
6 a substrate having first and second flat, opposite, sides;  
7 a pair of spiral antenna elements disposed on said first side of said substrate in which  
8 each of said elements has a corresponding feed point; and  
9 a conducting ground plane disposed on said second side of said substrate, wherein said  
10 first antenna and said second antenna are oriented so that an imaginary line drawn through said  
11 feed points corresponding to said first antenna does not coincide with an imaginary line drawn  
12 through said feed points corresponding to said second antenna and ~~The apparatus of claim 1~~  
13 wherein the performance of each of said antennas can be described by an axial ratio defined as  
14 the difference between vertical gain and horizontal gain at a particular frequency and wherein  
15 said axial ratio varies by no less than plus or minus 5 dB.

CLAIM 11 (original)

1 The apparatus of claim 10 wherein said spiral antenna elements makes at least three 360 degree  
2 turns.

**CLAIM 12 (original)**

1 The apparatus of claim 11 wherein said substrate separates said spiral antenna elements from  
2 said conducting ground plane by a distance that is no greater than 6 inches.

**CLAIM 13 (original)**

1 The apparatus of claim 12 wherein said imaginary line drawn through said feed points  
2 corresponding to said first antenna is orthogonal to said imaginary line drawn through  
3 said feed points corresponding to said second antenna.

**CLAIM 14 (original)**

1 The apparatus according to claim 12 wherein said antennas operate between 225 megaHertz and  
2 400 megaHertz.

**CLAIM 15 (original)**

1 The apparatus of claim 11 wherein said substrate separates said spiral antenna elements and said  
2 conducting ground plane by a distance that is no greater than 3 inches.

**CLAIM 16 (original)**

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- 1 The apparatus of claim 15 wherein said imaginary line drawn through said feed points  
2 corresponding to said first antenna is orthogonal to said imaginary line drawn through said feed  
3 points corresponding to said second antenna.

**CLAIM 17 (original)**

- 1 The apparatus of claim 15 wherein said antennas operate between 225 megaHertz and 400  
2 megaHertz.

**CLAIM 18 (original)**

- 1 The apparatus of claim 11 wherein said substrate separates said spiral antenna elements and said  
2 conducting ground plane by a distance that is no greater than 1 inch.

**CLAIM 19 (original)**

- 1 The apparatus of claim 18 wherein said imaginary line drawn through said feed points  
2 corresponding to said first antenna is orthogonal to said imaginary line drawn through said feed  
3 points corresponding to said second antenna.

**CLAIM 20 (original)**

- 1 The apparatus of claim 18 wherein said antennas operate between 225 megaHertz and 400  
2 megaHertz.

**CLAIM 21 (original)**

1 An antenna apparatus comprising:

2 first and second linearly-polarized conductor-backed spiral antennas wherein said  
3 antennas both simultaneously transmit or both simultaneously receive on substantially the same  
4 frequencies, wherein said antennas are spaced from each other and further wherein each of said  
5 antennas comprises:

6 a substrate having first and second flat, opposite, sides;

7 a pair of spiral antenna elements disposed on said first side of said substrate in which  
8 each of said elements has a corresponding feed point, said spiral antenna elements making at  
9 least three 360 degree turns; and

10 a conducting ground plane disposed on said second side of said substrate, wherein said  
11 substrate separates said spiral antenna elements from said conducting ground plane by a  
12 distance that is no greater than 6 inches,

13 wherein said first antenna and said second antenna are oriented so that an imaginary line drawn  
14 through said feed points corresponding to said first antenna is orthogonal to an imaginary line  
15 drawn through said feed points corresponding to said second antenna.

**CLAIM 22 (original)**

1 The apparatus of claim 21 wherein said antennas are spaced vertically.

**CLAIM 23 (original)**

- 1 The apparatus of claim 21 in which said spiral takes the form of an Archimedean spiral.

**CLAIM 24 (original)**

- 1 The apparatus of claim 21 wherein said spiral elements comprise a metal foil.

**CLAIM 25 (original)**

- 1 The apparatus of claim 21 wherein said antenna elements of said first and second antennas are  
2 mounted in a common plane.

**CLAIM 26 (original)**

- 1 The apparatus of claim 21 wherein said substrate has a dielectric constant of approximately 1.

**CLAIM 27 (original)**

- 1 The apparatus of claim 26 herein said substrate comprises a dielectric of DIVINYCELL  
2 (trademark).

**CLAIM 28 (original)**

- 1 The apparatus of claim 21 wherein said first and second antennas share a common conducting  
2 ground plane.

**CLAIM 29 (original)**

- 1 The apparatus according to claim 21 wherein said antennas operate between 225 megaHertz and  
2 400 megaHertz.

**CLAIM 30 (original)**

- 1 The apparatus of claim 21 wherein said substrate separates said spiral antenna elements and  
2 said conducting ground plane by a distance that is no greater than 3 inches.

**CLAIM 31 (original)**

- 1 The apparatus of claim 30 wherein said antennas operate between 225 megaHertz and 400  
2 megaHertz.

**CLAIM 32 (original)**

- 1 The apparatus of claim 21 wherein said substrate separates said spiral antenna elements and said  
2 conducting ground plane by a distance that is no greater than 1 inch.

**CLAIM 33 (original)**

- 1 The apparatus of claim 32 wherein said antennas operate between 225 megaHertz and 400  
2 megaHertz.

**CLAIM 34 (original)**



1 A communications method comprising:

2 using first and second linearly polarized, conductor-backed spiral antennas to both  
3 simultaneously transmit or both simultaneously receive on substantially the same  
4 frequencies,

5 wherein said antennas are spaced from each other and further wherein each of said  
6 antennas comprises:

7 a substrate with first and second flat, opposite, sides;  
8 a pair of spiral antenna elements disposed on said first side of said substrate in which  
9 each of said elements has a corresponding feed point, said spiral antenna elements  
10 making at least three 360 degree turns; and

11 a conducting ground plane disposed on said second side of said substrate, wherein said  
12 substrate separates said spiral antenna elements from said conducting ground plane by a  
13 distance that is no greater than 6 inches,

14 wherein said first antenna and said second antenna are oriented so that an imaginary line drawn  
15 through said feed points corresponding to said first antenna does not coincide with an imaginary  
16 line drawn through said feed points corresponding to said second antenna.

CLAIM 35 (original)

1 The method of claim 34 wherein said antennas are oriented so that said imaginary line drawn  
2 through said feed points corresponding to said first antenna is orthogonal to said imaginary line

3 drawn through said feed points corresponding to said second antenna.

CLAIM 36 (currently amended)

1 The ~~apparatus~~ method of claim 35 wherein said antennas are spaced vertically.

CLAIM 37 (currently amended)

1 The ~~apparatus~~ method of claim 34 wherein said antenna elements of said first and second  
2 antennas are mounted in a common plane.

CLAIM 38 (original)

1 The method of claim 34 wherein said first and second antennas are included in a first antenna  
2 array and further wherein duplicates of said first and second antennas are included in a second  
3 antenna array.

CLAIM 39 (original)

1 The method according to claim 38 wherein said first and second antenna arrays are used for  
2 transmitting and receiving communication on substantially the same frequencies wherein one of  
3 said arrays is used for transmitting and the other of said arrays is used for receiving.

CLAIM 40 (original)

1 The method of claim 35 wherein said first and second antennas are included in a first antenna

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2 array and further wherein duplicates of said first and second antennas are included in a second  
3 antenna array.

**CLAIM 41 (original)**

1 The method according to claim 39 wherein said first and second antenna arrays are used for  
2 transmitting and receiving communication on substantially the same frequencies wherein one of  
3 said arrays is used for transmitting and the other of said arrays is used for receiving.

**CLAIM 42 (currently amended)**

1 The ~~apparatus~~ method according to claim 34 wherein said antennas are operated between 225  
2 megaHertz and 400 megaHertz.

**CLAIM 43 (currently amended)**

1 The ~~apparatus~~ method of claim 34 wherein said substrate separates said spiral antenna elements  
2 and said conducting ground plane by a distance that is no greater than 3 inches.

**CLAIM 44 (currently amended)**

1 The ~~apparatus~~ method of claim 43 wherein said antennas operate between 225 megaHertz and  
2 400 megaHertz.

**CLAIM 45 (currently amended)**

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- 1 The ~~apparatus~~ method of claim 34 wherein said substrate separates said spiral antenna elements  
2 and said conducting ground plane by a distance that is no greater than 1 inch.

**CLAIM 46 (currently amended)**

- 1 The ~~apparatus~~ method of claim 45 wherein said antennas operate between 225 megaHertz and  
2 400 megaHertz.